

## REMARKS

### Foreign Priority

The acknowledgement, in the Office Action, of a claim for foreign priority under 35 U.S.C. § 119(a)-(d), and that the certified copies of the priority documents have been received, is noted with appreciation.

### Status Of Application

Claims 1-9 and 11-17 are pending in the application; the status of the claims is as follows:

Claims 1, 2, and 5 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,563,465 to Nakahara et al. (hereinafter the "Nakahara Patent").

Claim 1 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Japanese Publication No. 53-82286 (A) to Takekida (hereinafter the "Takekida Publication"), in view of the Nakahara Patent.

Claims 3 and 4 are objected to as being dependent upon a rejected base claim, but would be allowable if written in independent form including all of the limitations of the base claim and any intervening claims.

Claims 6-9 and 11-17 are allowed.

### Drawings

To date, no Notice of Draftsperson's Patent Drawing Review has been received. Applicants respectfully request receipt of this document when it becomes available. Please note that the original drawings filed in the patent application are "formal" drawings.

**Claim Amendments**

Claims 1, 3 and 4 have been amended to more particularly point out and distinctly claim the invention. These changes are not necessitated by the prior art, are unrelated to the patentability of the invention over the prior art, and do not introduce any new matter.

**Allowable Subject Matter**

The allowance of claims 6-9 and 11-17, by the Examiner, is noted with appreciation.

The objection to claims 3 and 4 as being dependent upon a rejected base claim, but allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims, is noted with appreciation.

**35 U.S.C. § 102(b) Rejection**

The rejection of claims 1, 2, and 5 under 35 U.S.C. § 102(b) as being anticipated by the Nakahara Patent, is respectfully traversed based on the following.

The Nakahara patent shows a piezoelectric actuator. Two piezoelectric devices 1 and 2 are supported at one end by a base 5. At the other end of the piezoelectric devices is a drive head 3, which places the piezoelectric devices 1 and 2 at a 90° relationship. A plurality of drive signals are applied to the piezoelectric devices (Figures 1(b) and 5-7). As a result, the drive head 3 may be moved in an elliptical orbit. (Fig. 2, col. 1, lines 14-30.)

In contrast to the cited prior art, Claim 1 includes an actuator:

wherein the displacing devices have a first natural frequency in a first natural vibration mode, in which the displacing devices are resonantly vibrated in the same phase, that substantially coincides with a second natural frequency in a second natural vibration mode, in which the displacing devices are resonantly vibrated in the opposite phase.

The rejection states that "the displacing devices have first and second natural frequencies and respective vibration modes, this is a common feature to vibrating devices, and Nakahara's appears as no exception." However, this statement is not supported by the record. The specification provides ten pages (pp. 17-27) of detail on how the relative characteristics of the displacing devices, compounding members, etc. must be combined to provide "a first natural frequency in a first natural vibration mode ...that substantially coincides with a second natural frequency in a second natural vibration mode." The Nakahara patent only discusses the resonant frequencies in terms of given characteristic and limitations to operation (column 2, lines 25-43). There is no suggestion in the cited prior art of any method to tailor resonant frequencies in different drive modes, much less to tailor them to meet the limitation from claim 1 quoted above. To anticipate, the cited prior art must show, expressly or inherently, every limitation of the claim. MPEP §2131. Thus, the cited prior art does not anticipate claim 1. Claim 2 has been incorporated into claim 1. Claim 5 is dependent upon claim 1, and thus includes every limitation of claim 1. Therefore, claim 5 is also not anticipated.

Accordingly, it is respectfully requested that the rejection of claims 1, 2, and 5 under 35 U.S.C. § 102(b) as being anticipated by the Nakahara Patent, be reconsidered and withdrawn.

#### **35 U.S.C. § 103(a) Rejection**

The rejection of claim 1 under 35 U.S.C. § 103(a), as being unpatentable over the Takekida Publication, in view of the Nakahara Patent, is respectfully traversed based on the following.

The Takekida publication shows two piezoelectric devices 4a and 4b positioned at 90° and connected by a connecting device 5 for driving a rotor 2. As with the Nakahara patent, the Takakida reference does not show or suggest an actuator having "a first natural frequency in a first natural vibration mode ...that substantially coincides with a second natural frequency in a second natural vibration mode." To provide a *prima facie* case for obviousness, the combined references must show or suggest every element of the claim.

MPEP 2143.03. None of the cited references shows or suggests the quoted limitation of claim 1. Therefore, claim 1 is not obvious over the cited prior art.

Accordingly, it is respectfully requested that the rejection of claim 1 under 35 U.S.C. § 103(a) as being unpatentable over the Takekida Publication, in view of the Nakahara Patent, be reconsidered and withdrawn.

### **CONCLUSION**

Wherefore, in view of the foregoing amendments and remarks, this application is considered to be in condition for allowance, and an early reconsideration and a Notice of Allowance are earnestly solicited.

This Amendment does not increase the number of independent claims, does not increase the total number of claims, and does not present any multiple dependency claims. Accordingly, no fee based on the number or type of claims is currently due. However, if a fee, other than the issue fee, is due, please charge this fee to Sidley Austin Brown & Wood LLP's Deposit Account No. 18-1260.


Any fee required by this document other than the issue fee, and not submitted herewith should be charged to Sidley Austin Brown & Wood LLP's Deposit Account No. 18-1260. Any refund should be credited to the same account.

If an extension of time is required to enable this document to be timely filed and there is no separate Petition for Extension of Time filed herewith, this document is to be construed as also constituting a Petition for Extension of Time Under 37 C.F.R. § 1.136(a) for a period of time sufficient to enable this document to be timely filed.

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Any other fee required for such Petition for Extension of Time and any other fee required by this document pursuant to 37 C.F.R. §§ 1.16 and 1.17, other than the issue fee, and not submitted herewith should be charged to Sidley Austin Brown & Wood LLP's Deposit Account No. 18-1260. Any refund should be credited to the same account.

Respectfully submitted,

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APPENDIX

**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

The following is a marked-up version of the changes to the claims which are being made in the attached response to the Office Action dated September 3, 2002.

**IN THE CLAIMS:**

**Claim 2 has been cancelled.**

1. (Three Times Amended) An actuator comprising:  
a plurality of displacing devices for generating displacements;  
a compound member, connected to the displacing devices, for compounding displacements of the displacing devices;  
a base member for holding base ends of the displacing devices to which the compound member is not connected;  
a pressing member for pressing the compound member to an object to be driven;  
and  
a driver for resonantly driving the displacing devices so as to move the compound member along an elliptic or a circular trail;  
[wherein the driver resonantly driving the displacing devices causes only the displacing devices and the compound member to substantially vibrate] wherein the displacing devices have a first natural frequency in a first natural vibration mode, in which the displacing devices are resonantly vibrated in the same phase, that substantially coincides with a second natural frequency in a second natural vibration mode, in which the displacing devices are resonantly vibrated in the opposite phase.

3. (Twice Amended) An actuator in accordance with claim [2]1, wherein a mass of the compound member is designated by a symbol "M", a length of each displacing device is designated by a symbol "L", a height of each displacing device is designated by a symbol "H", and a mass of each displacing device is designated by a symbol "m", and the

equation

$$M=(L^2/H^2-0.88)m/2.63$$

is satisfied.

4. (Twice Amended) An actuator in accordance with claim [2]1, wherein a mass of the compound member is designated by a symbol " $M_c$ ", a mass of each displacing device is designated by a symbol " $m$ ", a spring constant of each displacing device in the expansive deformation is designated by a symbol " $k_1$ ", a spring constant of each displacing device in the bending deformation is designated by a symbol " $k_3$ ", a moment of inertia of the base member is designated by a symbol " $I_z$ ", a rotation radius of the base member is designated by a symbol " $R$ ", and an equivalent mass of the base member converted to a cantilever is designated by a symbol " $M_b$ ", and the equations

$$(k_1/(1-p))/(M_c+(1-p)m/3)=(k_1/(1-q)+k_3)/(M_c+(1-q)m/3+m/2)$$

$$p=(M_c+m/3)/(M_c+I_z/R^2+2m/3)$$

$$q=(M_c+5m/6)/(M_c+M_b'+7m/6)$$

are satisfied.